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Description

OVERHEAD SPACE ACCESS CONVERSION MONUMENT AND SERVICE AREA STAIRCASE AND STOWAGE SYSTEM

BACKGROUND OF INVENTION

[0001] The present invention is related generally to aircraft stowage systems. More particularly, the present invention is related to stowage systems and their conversion to enable access to various overhead areas of an aircraft.

[0002] Space within a crown of a wide body aircraft is typically not efficiently or fully utilized, due to the loss of main deck space in access thereof. In order to maximize stowage and seating area within a commercial passenger aircraft, efficient use of space within the aircraft is desired. Efficient use of aircraft space can increase the number of passengers transported per flight and the capability of an aircraft to store more items on board.

[0003] Increased efficiency of space usage not only increases physical capacity of an aircraft, but can also increase customer and crewmember satisfaction and revenue per flight. For example, and particularly with respect to long flights, additional space allows for increased stowage of food, baggages, and other items of various sizes. Improved efficiency of space usage also provides increased space for passenger and crewmember seating, rest areas, and movement about the aircraft.

[0004] In larger aircrafts that are typically used for longer flights, overhead space modules, such as crew rest stations and additional stowage compartments, are provided in the space between the curved top portion of the hull of the aircraft and the lowered ceiling of the aircraft. These overhead space modules are typically accessible through a dedicated stairway module with corresponding loss of main deck space. As a result, overhead space usage has been limited to large commodities, such as crew rests, that may be relocated. The relocation of the large commodities provides more main deck space than is required for access thereof.

[0005] Thus, there exists a need for an improved access mechanism for access to overhead areas of an aircraft that is

space efficient, cost effective to manufacture and implement, and easy and convenient to utilize and operate.

SUMMARY OF INVENTION

[0006] One embodiment of the present invention provides an overhead area access staircase stowage system that includes a servicing unit having a stowage unit and a staircase proximate to the stowage unit. The staircase has a stowed state and a deployed state. The staircase includes multiple stair elements and a state actuating system. The state actuating system is used to transition the stair elements between the stowed state and the deployed state.

[0007] The embodiments of the present invention provide several advantages. One such advantage is the provision of an overhead area access staircase stowage system that is convertible between a stowage unit and a staircase. In so providing, the stated embodiment provides efficient usage of an aircraft space by allowing for crewmembers to stow objects, such as galley carts, during Taxi, Takeoff, and Landing and to access overhead areas during flight.

[0008] A couple of other advantages provided by multiple embodiments of the present invention are the provisions of staircases that can be stowed within a stowage space, a ceiling, or a floor of a vehicle or structure.

[0009] Another advantage provided by an embodiment of the present invention is the provision of an aircraft service cart area that incorporates an overhead area access staircase and stowage system. As such, the stated embodiment provides increased space efficiency of service cart and corresponding overhead areas.

[0010] Yet other advantages that are provided by embodiments of the present invention are the provisions of overhead area access staircase stowage systems that incorporate staircases with platform members and stowage modules for easy performance of various tasks related to the servicing of an aircraft and increased stowage capability of service areas.

[0011] The embodiments of the present invention also provide various devices and mechanisms for transitioning overhead area access staircase and stowage systems between stowed states and deployed states.

[0012] The present invention itself, together with further objects and attendant advantages, will be best understood by reference to the following detailed description, taken in conjunction with the accompanying drawing.

Brief Description of Drawings

[0013] Figure 1A is a front view of an aircraft service area incor-

porating an overhead area access staircase and stowage system in accordance with an embodiment of the present invention;

[0014] Figure 1B is a cross-sectional side view of a staircase of the overhead area access staircase and stowage system of Figure 1A taken along sectional line 1B;

[0015] Figure 1C is a top view of the overhead area access staircase and stowage system of Figure 1A;

[0016] Figure 2A is a top view of a dual cart service area incorporating an overhead area access staircase and stowage system in accordance with another embodiment of the present invention; and

[0017] Figure 2B is a side view of the dual cart service area of Figure 2A.

Detailed Description

[0018] In the following Figures the same reference numerals will be used to refer to the same components. While the present invention is described primarily with respect to overhead area access staircase and stowage systems for use within an aircraft, the present invention may be adapted and applied in various vehicle and non-vehicle applications. The present invention may be applied in aeronautical applications, nautical applications, railway

applications, automotive vehicle applications, and commercial and residential applications, as well as in other applications known in the art where space is limited and efficient use thereof is desired. Also, the staircase and stowage systems of the present invention may be utilized to access overhead areas, to access rest areas, to access various service areas, to ascend or descend between floors, or for other purposes known in the art.

[0019] In the following description, various operating parameters and components are described for one constructed embodiment. These specific parameters and components are included as examples and are not meant to be limiting.

[0020] Also, in the following description the term "object" may refer to any object that may be stored or stowed. An object, for example, may include food, utensils, condiments, baggages, tools, bedding linens, pillows, strollers, or various other objects that may be stored or stowed in a structure.

[0021] Referring now to Figures 1A-C, a front view, a cross-sectional side view, and a top view of an aircraft service area 6 incorporating an overhead area access staircase stowage monument or stowage system 7, are shown in accordance with another embodiment of the present in-

vention. The staircase and stowage system 7 includes a servicing unit 8 having a first portion 9 and a second portion 10. The first portion 9 has a staircase 12 that resides between a pair of section dividers 13. The first portion 9 includes a first platform member 14 and the second portion 10 includes a second platform member 16 and a divider 17. The staircase 12 is shown in a deployed state 18 in Figure 1A and in a stowed state 20 in Figure 1B. The staircase 12 and the platform 16 reside within a first staging area 21 and a second staging area 22, respectively.

[0022] When stowed, the majority of the staircase 12 resides at a level above the platform 14 and above a cart level 23. When deployed, the staircase 12 resides at a level substantially below the platforms 14 and 16 or at the cart level 25 and may be used to access the overhead area 26. The staircase 12 may be used to store various objects. Although the staircase 12 is shown as having a deployed state 18 directly below the platform 14 and a stowed state 20 directly above the platform 14, the staircase 12 may be easily modified to be stowed into a space above a ceiling 28 or into a space below a floor 30 of the aircraft 32. Also, although the stowage system 7 is shown within the servicing unit 10, which is in the form of a galley, it may

be located within other servicing units known in the art. The stowage system 7 may be located to the right of an aisle 33, as shown, or may be in various other locations within the aircraft 32.

[0023] A pair of service carts 34 is removed from below the staircase 12 before deployment thereof. The service carts 34 may be returned or stowed below the staircase 12 when the staircase is stowed.

[0024] The staircase 12 includes stair elements 40, coupled between vertical portions 42 of a U-shaped stair support member 44, and stowage modules 46, which reside between the stair elements 40. Note that the platform 14 may be used to perform staging tasks or may serve as a stair element to access the overhead area 26, as shown. The U-shaped member 44 slides and is guided on rollers 48 when transitioned between the deployed state 18 and the stowed state 20.

[0025] The stair elements 40 may be of various sizes, shapes, and may be formed of various materials. The stair elements 40 may include parallel adjacent step elements 47 and angled adjacent step elements 49. The angled step elements 49 allow crewmembers to rotate towards a given area while remaining faced in a physically oriented direc-

tion that is perpendicular to step edges 51. This may, for example, allow ease in accessing areas above laterally adjacent carts, such as carts 53, as opposed to areas over or directly in front of carts 55.

[0026] The stowage modules 46 are enclosed by the stair elements 40, the U-shaped member 44, a back member 50, and access panels 52. The access panels 52 may have handles 54 and may be rotated on hinges 57 and slid into the stowage spaces 56. The access panels 52 and the hinges 57 may also be considered stair elements. Other stair elements known in the art may also be incorporated into the staircase 12 and the stowage modules 46.

[0027] The staircase 12 also includes a state actuating system 60, which is used to transition the staircase 12 between the deployed state 18 and the stowed state 20. When in a manual operating arrangement, the state actuating system 60 may include a deployment handle 62 and a potential energy device 64. When in an automated operating arrangement, the state actuating system 60 may include a motor 66 and a drive gear 68 coupled between the U-shaped member 44 and the motor 66. The staircase 12 may be raised and lowered via an actuation switch 70 coupled to the motor 66.

[0028] Although the potential energy device 64 is shown as a spring, it may be in various forms. The potential energy device 64 assists transition of the staircase 12 between the deployed state 18 and the stowed state 20. Any number of potential energy devices may be utilized. The potential energy device 64 may be coupled to the U-shaped member 44, as shown, or may be incorporated using some other technique known in the art.

[0029] The dividers 16 include a first divider 80 and a second divider 82. The second divider 82 separates the staircase 12 that may be within a first service cart stowage area 81 of a first stowage unit 83 from a second service cart stowage area 84 of a second stowage unit or a service cart stowage unit 85. The dividers 16 may include cart bumpers 86. Any number of cart bumpers 86 may be utilized. The cart bumpers 86 guide the service carts 24 into the cart stowage areas 83 and 84 and prevent damage to the dividers 16.

[0030] The platform 16 and the base 92 of the staircase 12 may have multiple service cart retainers 90 coupled thereto that are used to prevent the carts 24 from rolling out of the cart areas 83 and 84 when stowed. The retainers 90 may be in the form of quarter-turns, paddles, or may be

in some other form known in the art. The retainers 90 may also be coupled to a base 92, which is in turn coupled to the U-shaped member 44.

[0031] The staircase 12 may also include a release mechanism 100. The release mechanism 100 may include a lever 102 to retain the staircase 12 in the stowed state 12 until desired deployment thereof. The lever 102 may be coupled to the first divider 80, as shown, and may be manually rotated or rotated via the actuator 104. Although the staircase 12 is shown as being located to the left of the second divider 82, it may be located to the right of the divider 82. The staircase 12 may be deployed and stowed in various locations. In one embodiment of the present invention, the staircase 12 is stowed above the ceiling 28. In another embodiment of the present invention, the staircase has a variable height deployed state such that the vertical position of the staircase 12 may be adjusted as desired for access to the overhead area 26.

[0032] In accessing the overhead area 26 the staircase 12 is accessed within the first stowage unit 83 and released using the release mechanism 100. The staircase 12 is deployed within the first stowage unit 83. The staircase 12 or stair elements 40 are released to allow vertical movement

thereof. The staircase is glided and supported on the guides 48 down to a service cart level 25. A crewmember ascends the stair elements 40 and interacts with objects in the overhead area 26. Upon descent of the stair elements 40, the crewmember may then stow the staircase 12.

[0033] Referring now to Figures 2A-B, a top view and a side view of a dual cart service area 110, incorporating an overhead area access staircase stowage system 7", are shown in accordance with another embodiment of the present invention. The dual cart service area 110, as shown, includes ten service carts 112. A stowage area 112 is shown having a two-cart depth D_1 below a platform 113. The service carts 112 are stowed below the platform 113 in a "two deep" arrangement. Two carts 113 may be removed from the staging area 112 and temporarily stowed beneath a worktable 122 to allow the deployment or lowering of the staircase 12". In this configuration the staircase 12" may be used to access areas above any of the service carts 112.

[0034] Even though the staircase 12" is shown as having a single cart depth D_2, the staircase 12" may be easily modified to have a two-cart depth or a depth that is approximately

equal to the staging area depth D_1. In an example embodiment, the single cart depth D_2 is approximately 40 inches or the depth of a single service cart, which is deeper than the depth of a majority of traditional overhead access stairways. The embodiment of Figures 2A-B in allowing for increased service cart depth provides a crewmember with greater ease in accessing overhead areas. The increased staircase depth reduces incline of stair or step elements within the staircase and also allows for increased depth of stowage modules contained therebetween.

[0035] The above-described staircase systems although described as being manually or electrically actuated, may also be hydraulically or pneumatically actuated, using techniques known in the art.

[0036] The present invention provides stowage systems that provide access to overhead areas through conversion thereof. The stowage systems include staircases that can be conveniently stowed in a compact arrangement within a stowage area or at various levels, such as above a service cart level. The present invention may be applied in various applications and provides efficient use of space and increased stowage ability.

[0037] While the invention has been described in connection with

one or more embodiments, it is to be understood that the specific mechanisms and techniques which have been described are merely illustrative of the principles of the invention, numerous modifications may be made to the methods and apparatus described without departing from the spirit and scope of the invention as defined by the appended claims.